Final Report

SOCIO-ECONOMIC EVALUATION OF FORT NELSON TSA TIMBER HARVEST SCENARIOS

Prepared for:
B.C. Ministry of Forests

Prepared by:
The ARA Consulting Group Inc.

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This report is one of four documents that will be released for each Timber Supply Area as part of the Timber Supply Review. A brief description of the four reports follows. An address is also provided to which comments on this report can be sent.

The purpose of these documents is to provide information to the public about the results of timber supply analyses and socio-economic evaluations, and to solicit feedback on the technical content of the evaluations and on resource management objectives to be met when the allowable annual cut is determined.

Timber Supply Analysis Report:

Forest inventory data is analyzed to forecast short and long-term harvest schedules that would result from continuing present management practices into the future. The analysis helps to illustrate the effects of uncertainties in the inventory data and other forest management assumptions. None of the timber supply forecasts produced in this analysis should be considered to represent options for allowable annual cut decisions. Comments on this report are expected to concentrate on technical matters such as the inventory data, resource management assumptions, and methods of analysis.

Socio-Economic Analysis Report:

Information is presented which outlines the economic base of the Timber Supply Area and the role of resources in supporting the industrial infrastructure and employment. Several timber supply forecasts are analyzed in terms of employment and economic impacts, both short and long term, including implications for developments in other resource sectors. As with the Timber Supply Analysis report, the scenarios in this report do not represent specific options for allowable annual cuts, but rather are chosen as useful reference points within a full range of choices. Comments are expected to focus on the accuracy of social and economic data, assumptions about trends in regional development, and methods of analyzing impacts of different timber supply schedules.

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Public Discussion Paper:

This is the main document for public review prior to the Chief Forester's decision on an allowable annual cut for the Timber Supply Area. Results of the two reports mentioned above, the Timber Supply Analysis Report and the Socio-Economic Analysis Report, are summarized and discussed in relation to management strategies that the Chief Forester might consider. Through the public review, the Chief Forester will become aware of public interests and concerns around issues that are under his direct mandate. Where the public responses relate to the broader social and economic objectives of government, they will be forwarded to the Minister of Forests to solicit government direction. There will be a minimum of two months for public review of the Discussion Paper prior to the Chief Forester making an Allowable Annual Cut decision. District Managers will hold one or more public information sessions during this period.

Chief Forester's Allowable Annual Cut Rationale Statement:

To conclude the process of timber supply review and allowable annual cut determination, the Chief Forester will release a statement of his rationale for the final decision. This statement will include a description of the long-term harvest schedule of which the allowable annual cut represents the first five years, any specific performance requirements to be met by the forest industry in order to fulfill that schedule, and consequences of not meeting performance goals.

Public Comments on the Socio-Economic Analysis Report

Any comments regarding the Fort Nelson Socio-Economic Analysis Report should be submitted by August 31, 1993, to Bob Read, District Manager, Fort Nelson Forest District, R.R. #1, Mile 301, Alaska Hwy., Fort Nelson, B.C., V0C 1R0.

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1.0 Introduction

1.1 Background

The following report evaluates the implications of proposed new timber harvest scenarios for the Fort Nelson Timber Supply Area (TSA). These harvesting scenarios were prepared by the Ministry of Forests to reflect Integrated Resource Management (IRM) harvesting guidelines, and are described in more detail in the "Fort Nelson TSA Timber Supply Analysis Report" prepared by the Prince George Forest Region in June 1992. They are also contained in the "Options Report" prepared by the Fort Nelson Forest District for public discussion in October 1992. These particular harvesting scenarios may be subject to further revisions, and they are not necessarily exclusive of all options that may ultimately be considered. One objective of this report is to assist in the making of such final revisions.

The report follows the multiple account guidelines framework laid down by the Ministry of Forests for its forest land management process. This framework is designed to focus attention on the full range of economic and non-economic impacts and values that are derived by all forest land user groups. While not all can be evaluated with precision, the framework at least ensures that none of consequence are neglected. Planning decisions are therefore more fully informed and more aware of the potential trade-offs that can arise.

The report could not have been completed without the full co-operation of many parties, in particular: management staff at Tackama Forest Products; the Fort Nelson Economic Development Committee; and Ministry of Forests staff in Victoria, Prince George and Fort Nelson. It is hoped that the report does justice to the various positions expressed and material submitted, within the confines of a relatively tight time frame and the Ministry of Forest's particular terms of reference.

1.2 Summary Findings

The principal summary findings of the report are summarized in Tables 1.1 and 1.2. For a complete understanding of what these entries refer to, reference should be made to the full report. Table 1.1 shows the range of estimated impacts at the Fort Nelson TSA level, Table 1.2 the range of impacts at the provincial level. Scenario 1 represents a 28% harvest reduction scenario, Scenario 2 a 21% harvest reduction scenario, the difference between them being the assumptions made with respect to the silviculture standards assumed. Year 1 forestry, income, and revenue impacts refer to the immediate impact of the implementation of either of these two lower harvest scenarios as compared to current harvest and mill operating levels. Future year impacts refer to the differences between the two scenarios, shown in terms of the additional job and income losses associated with the lower harvest levels of Scenario 1. Employment income impacts are shown on an after-tax basis at the TSA level, and a before-tax basis at the provincial level.

Table 1.1: Summary of Fort Nelson TSA Impacts

	Scenario 1 (Basic Silviculture)	Scenario 2 (Incremental Silviculture)	Comment
Economic Account			
Forestry Driven Job Losses			
Year 1	218	168	Compared to present situation
With Out Migration	278	214	
Future Year Impacts: Scenario 1 relative to Scenario 2			
Years 1 to 20	49	-	Additional losses under Scenario 1
Years to 21 to 40	73	-	
Long Term Tourism Job Gains	27	27	Timing uncertain
Net Income Losses			
Year 1	$6.5 M.	$5.1 M.	Net of taxes
Future Years: Scenario 1 relative to Scenario 2			
Years 1 to 20	$1.5 M.	-	Annual
Years 21 to 40	$2.2 M.	-	Annual
Community Account			
Unemployment	+9%	+7%	
Social Services	Higher Demand		
Revenue Base	Minimal Effect		
Population	Potential Decline		
Environmental Values	Moderately Beneficial		
Native Concerns	Traditional Values Enhanced Economic Values Downplayed		

Table 1.2: Summary of Provincial Impacts

	Scenario 1 (Basic Silviculture)	Scenario 2 (Incremental Silviculture)	Comment
Economic Account			
Forestry Driven Job Losses			
Year 1	371	286	Compared to existing situation
Future Year Impacts: Scenario 1 relative to Scenario 2			
Years 1 to 20	82	-	Additional losses under Scenario 1
Years 21 to 40	123	-	
Long Term Tourism Job Gains	27	27	Timing uncertain
Gross Income Losses			
Year 1	$13.0 M	$10.0 M	Pre-tax
Future Years: Scenario 1 relative to Scenario 2			
Years 1 to 20	$2.9 M.	-	Annual
Years 21 to 40	$4.3 M.	-	Annual
Provincial Revenues			
Year 1 Losses	$4.4 M.	$3.3 M.	Including stumpage, personal income and other taxes
Environmental Values	Moderately Beneficial		

2.0 Socioeconomic Profile of the Fort Nelson TSA

2.1 General Area Profile

The Fort Nelson TSA occupies the north-east corner of the province, and is the second largest of all 36 TSA's. It's boundaries correspond to those of the Fort Nelson Forest District, and it forms part of the Prince George Forest Region. It is bordered to the south and west by the Fort St. John, Mackenzie, and Cassiar Forest Districts. The District encompasses parts of the Alberta Plateau, the Rocky Mountain Foothills, the Liard Plateau and the Liard Plain, forms part of the Arctic watershed, and is drained by the Liard River and its major tributaries - the Fort Nelson, Prophet, Muskwa, Toad, and Petitot Rivers.

The Fort Nelson TSA covers 8.2 million hectares, approximately 8.6% of the total provincial land area of 94.8 million hectares. In addition to the major centre of Fort Nelson, it includes the unincorporated areas of Prophet River, Muskwa Heights, Steamboat, Summit Lake, Toad River, Muncho Lake, and Smith River. Outside of Fort Nelson, the area is almost all remote wilderness, with thousands of kilometres of rivers and hundreds of lakes. The District is bisected by the Alaska Highway, which enters the District at Mile 206 (Minaker), and continues into the Yukon just after Coal River (Mile 533). Major all weather road access is limited to three roads - the Alaska Highway, Highway 77 (the Liard Highway) which connects the Alaska Highway at Fort Nelson to Fort Simpson in the NWT, and the Desan Resource Development Road to the east providing access to the major oil and gas exploration areas. Road access limitations are reflected in the harvesting patterns to date and will continue to be a major influence in future resource development.

2.2 Population and Economy

The Fort Nelson TSA overlaps the Fort Nelson-Liard Regional District (85,800 square kilometres), and contains all of that District's communities with the exception of the communities of Coal River and Fireside, which lie just to the west of the TSA on the Alaska Highway. The Regional District's 1991 census population was estimated at 5038 (compared to 5138 in 1986), and Fort Nelson's at 3804 (compared to 3729 in 1986). Regional District staff believe that this understates Fort Nelson's actual population: they point to positive net migration in 1991 and 1992, a reversal of the pattern of the previous ten years. The positive population and economic outlook is continuing, with increased new construction activity; record low housing vacancy rates (currently at 2% as compared to 32% in 1986); and unemployment rates below the provincial average (for 1991, 5.4% of the working age population as compared to a provincial rate of 7.1%). In addition to a recovery in the forestry sector, the area also received an economic boost from the increase in tourist traffic and spending associated with Rendezvous '92, the official commemoration of the 50th anniversary of the construction of the Alaska Highway.

The area's present labour force is estimated at between 2,400 and 2,500 people.

The largest private sector employers are:

- Tackama Forest Products Ltd., (opened in 1973), which provides direct employment for between 550 and 590 FTE's (depending on operational levels), of whom 350 to 400 are employed at the mill site, with the balance in harvesting and woodlands operations (approximately 60 of the latter group are non-resident in the Fort Nelson area).

- Canadian Chopsticks Manufacturing Co. Ltd., (opened in April 1990), with a direct FTE total of 180, of whom 150 are at the mill and 30 are contract loggers;

- Westcoast Energy Ltd., (opened in 1968), with a direct FTE total of about 130;

- The oil and gas exploration sector, which provides direct employment for between 100/150 FTE's.

Significant public sector employers include:

- B.C. Rail, with an estimated 12 FTE's;

- Fort Nelson and District Hospital, with approximately 60 FTE's;

- Fort Nelson School District 81, with approximately 97 FTE's.

These are the leading area employers for which reasonably firm numbers can be readily identified. In addition to the two key sectors of forestry and energy, the transportation, government, and recreation and tourism sectors are of particular importance to the Fort Nelson area. Fort Nelson serves as a regional transportation hub, with daily air service, a B.C. Rail cargo car depot, several trucking line depots, and a barging service. In addition to the Alaska Highway, the completion of the Fort Nelson-Fort Simpson highway in 1984 further enhanced Fort Nelson's transportation service role. Government services include those of the local and regional governments and those of provincial ministries such as Forests, and Transportation and Highways; because of Fort Nelson's position as the only population centre of significance for hundreds of miles around, the towns administrative and public service role is of crucially more significance than for most other towns of it's size in British Columbia.

Recreation and tourism is also very important for the wider area (this is discussed more fully in the next section). Though potential does exist, developments in other sectors have been very limited. There is little farming in the area, largely because of the small local market and distance to outside markets. This is notwithstanding the substantial arable acreage within the wider Fort Nelson area. Up until recently the area had attracted little mining interest, as the mineralized areas were quite remote, with mines requiring high grade ore and/or prices to be viable. A high grade copper deposit has however recently been located, and interest in the possibilities for this development remain high within the community. Finally, while the Liard

River's hydroelectric potential is well known, the future damming of the river can almost certainly be ruled out given today's energy economics and politics.

2.3 The Forestry Sector

Up until April 1990, when the Canadian Chopsticks operation opened, the area's forestry sector was synonymous with the operations of Tackama Forest Products Ltd. Tackama is a "home-grown" company, originally incorporated in 1973 for the very purpose of developing/exploiting the Fort Nelson area timber resource. Tackama has since been acquired (October 1989) by Slocan Forest Products Ltd., a 100% B.C. owned company.

Tackama's principal facilities are a log stud mill and planer (rebuilt in 1987), and a veneer/plywood plant (upgraded in an $8.6 million modernization in 1992). The complex is designed to process a total of 900,000 m^3 of coniferous and deciduous species, and has most recently (1992) operated to 90% of that throughput capacity. Coniferous (spruce) comprises 85% of the wood feed, and deciduous (largely balsam/poplar, i.e. cottonwood), makes up the balance. Major lumber markets are the USA (80%) and Japan (15%); most of the plywood is sold in Canada (particularly Central and Eastern Canada), with small amounts being shipped to Japan. Almost 80% of the veneer is input to the plywood operation, with the remaining 20% going to Cantree Plywood in Vancouver (50% owned by Tackama). 80,000 of coniferous BDU chips are also produced which go to Fibreco Export (partly owned by Slocan) under an arrangement which expires in 1996.

Tackama is the largest single employer in Fort Nelson, with a full capacity employment total of 590 direct FTE's, of whom 371 are employed at the mill, and 219 in contracted woodland operations.

2.4 Recreation and Tourism Sector

The area's recreation and tourist oriented economy can be sub-divided into three distinct sub-groups, i.e.,:

- Touring (Alaska Highway) Traffic;
- Game Hunting/Guide Outfitter Operations;
- Adventure Travel/Outdoor Recreation.

2.4.1 Touring Traffic

The Fort Nelson TSA covers most of the northern half of the Peace River/Alaska Highway Tourism Region. The Alaska Highway traverses the region and serves as a major transportation corridor for local resident, vacationing and commercial traffic alike. This whole region is currently one through which most non-resident visitors travel in order to get somewhere else, e.g., Alaska or southern B.C. (with many continuing to take the Inside Passage ferry route between Skagway Alaska, Prince Rupert, and Port Hardy on Vancouver Island). Annual traffic

on the highway is over 180,000 vehicles, concentrated in the summer months. Traffic levels for 1992 were 20% to 30% higher, largely due to the highway's 50th anniversary celebrations.

Beginning with the Prophet River Recreation Area in the south, there are at present 7 provincial parks and/or recreation areas lying within the Fort Nelson TSA area, all of which are adjacent to the Alaska Highway. For the most part, these are utilized by touring visitors as an overnight stop as they travel north or south. Five of the seven sites (Prophet River RA, Andy Bailey RA, Stone Mountain Park, Muncho Lake Park, and Liard River Hotsprings) offer superior hiking, canoeing, fishing, and other recreational opportunities. The popularity of these sites as stopping and camping spots for visitors is indicated in the following table, which also illustrates the relatively heavier use of the park areas well to the west of Fort Nelson (and lying outside of the operable forest area):

Park Usage, Fort Nelson TSA Area, 1991

Parties Total	Campground Overnight	Day Use	Total Parties
Liard River Hotsprings	6,584	29,694	36,278
Muncho Lake	2,216	8,539	10,755
Stone Mountain	1,425	7,159	8,584
Andy Bailey RA	185	2,962	3,147
Prophet River RA	1,341	6,293	7,634

Source: Park Data Handbook, Ministry of Environment, Land and Parks, 1991.

According to district interviewees, the general objective for non-resident vehicular traffic is that of inducing an added day or two of stay in the region. In addition to the park areas noted, there are along the highway itself, from Prophet River to Coal River, a total of sixteen combination gas/food/lodging establishments (excluding the immediate Fort Nelson area) to accommodate this traffic. Some of these offer boat rentals, camping, or other such services.

Significant additional wilderness area facilities for the Fort Nelson TSA are presently under consideration: These include two new parks (Grayling River and Foothills) and a major Wilderness Study Area (Muskwa) in the western half; and a second wilderness area (Maxhamish Lake/Petitot River) in the far north-east. While the land area involved would increase the TSA's current protected area more than tenfold, these are in locations currently too remote to be of economic interest to area licensees. The land areas in question are excluded from any working forest area scenarios examined below.

A recent survey[1] prepared the following general profile of the area's visitors:

- There are an estimated 400,000 visitors annually to the Fort Nelson-Liard region, of whom an estimated 53%, or 228,000, are B.C. residents, and an estimated 47%, or 172,000, are non-B.C. residents. The average length of stay for non-residents is a little under three days.

- Visitors fall into one of five groups: Business travellers (comprising 7% of the total); Adventure travellers (5%); Visiting friends and relatives of residents (29%); Travellers in transit to somewhere else (39%); and Touring parties (20%).

- For non-business travellers, per person expenditures per day ranged between $35 and $100.

Future expansion plans are largely directed toward the adventure travel groups, touring parties, and those in transit to somewhere else; these groups are predominantly comprised of non-residents. The adventure travel group is separately discussed below; the other two groups are similar in that their recreation experience is bound up in the Alaska Highway experience. A high proportion of these visitors are retirees, typically travelling in an RV or camper. Whilst they are not likely to venture too far off the Alaska Highway into wilderness areas, an abundance of wildlife and of scenic vistas are important to enhancing their travel experience. On the basis of the above report, this appears to be a substantial market, comprising approximately 240,000 visitors and annual expenditures in the $36 million range (based on an average three day stay and $50 in daily expenditures).

2.4.2 Big Game Hunting/Guide Outfitting

North-eastern B.C. is a relatively important destination centre for hunting and other wilderness packages. Based on the licenses assigned by the Ministry of the Environment to the North-East region as a whole in 1992, we estimate that there are 13 licensed guide outfitters operating within the area covered by the Fort Nelson TSA (of these, we estimate that 7 are resident in the area). Based on a 1989 DPA/ARA industry survey (for all of B.C.), the following general North-East industry characteristics may be inferred:

- Operations in the northeast are larger on average than those in the rest of B.C. both in terms of average revenues and of employment created (3.1 P.Y.'s per operation versus 1.5 for the province as a whole). This generally larger level of operation is related to the area's superior hunting opportunities, with a preponderance in the average hunting package of more highly valued species (e.g., Sheep, Grizzly and Black Bear, Elk and Caribou). Hunting activities also predominate over less valued non-hunting activities (sport fishing, wildlife viewing, trail riding). Thus, hunting

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[1] Fort Nelson - Liard Regional District Commercial Backcountry Recreational Study', Equus Consulting Group, 1992.

accounts for over 98% of revenues in the north-east, as compared to 89% province-wide. Wildlife viewing and trail riding is generally deterred because of the extensive muskeg in the uplands and dense foliage in the riverbed lowlands, while the silt-prone rivers and dominant fish species (pickerel, jackfish, grayling, northern pike, walleye, and turbot) present less attractive sport fishing opportunities than are available elsewhere in the province.

- The client base is almost exclusively non-Canadian.

Based on the ratios estimated for the 1989 study, the 13 active guide outfitters in the area would be currently supporting approximately 40 FTE's and generating approximately $2.5 million in annual revenues. These industry averages conceal significant scale differences between operations within the working forest area, and those outside and to the west. The western based operations are significantly larger and more diverse in their client and product base, largely due to the significantly superior hunting opportunities that lie to the west. Two management unit areas within the working forest component of the TSA have in fact not been licensed, due to lack of interest on the part of area guides. Within the working portions of the TSA therefore, the potential for economic gain or loss arising out of different timber harvesting scenarios is less than elsewhere in the TSA.

Parallel to the licensed guide outfitting sector is an unregulated more loosely organised sector comprised of part-time "packers" that provide similar guiding services to locals or to other B.C. residents. They are precluded from servicing non-residents. There are no reliable estimates of how many there are, but they are not many. They often conflict over territory rights with the licensed outfitters.

2.4.3 Adventure Travel/Outdoor Recreation

While based on the same general wilderness resource, the adventure travel or outdoor recreation sector is considered a separate activity from that of the guide outfitters, which emphasize wildlife hunting. Province-wide it embraces heli-skiing, white water rafting, trail riding, mountaineering, hiking, kayaking, etc.; sport-fishing is sometimes included, sometimes excluded. Based both on a 1988 ARA industry survey, and on interviews with the Peace River Alaska Highway Tourist Association, this appears to be a very undeveloped industry sector in the north-east. Local tourist association sources could identify only one significant (non-guide outfitter) adventure travel operator in the area, i.e., Liard Tours, which operates a float plane service to fish remote lakes (e.g., Highland Glen or Muncho Lake). This is generally agreed to be an area with future expansion potential in the general North-East region.

2.5 The Energy Sector

Northeastern B.C. is an extension of the Great Plains region and the only sedimentary area in British Columbia that is currently producing oil and gas. Given the long history of drilling activity in the region, the infrastructure required to service the various gas fields is in place and well developed (a factor which will significantly reduce the cost of any further development activity in the region). The gas pipelines which service the area are an extension of Westcoast Energy's initial gas pipeline, brought into the Peace River district in the 1950's to service reservoirs discovered in the vicinity of Dawson Creek. In 1964, this pipeline was extended to Fort Nelson, from the main Westcoast Energy pipeline at Chetwynd, to service the Clarke Lake natural gas field. This gas gathering system has since been extended to the north, to service the Poplar Hills region, and further south to more effectively service the Clarke Lake and Adsett Fields. In total, 112 wells have been drilled in the region since the initial discovery in the Tenaka Pool; however, the bulk of the drilling activity occurred over the period from 1950 to 1980. While drilling activity is still present in the Clarke Lake and Adsett Fields, only 22 wells have been drilled in the region over the last 12 years (9 of these wells were drilled between 1990 and 1992), and most of the recent drilling activity has occurred in the Milo Field to the west of the Alaska Highway.

In addition to the extensive pipeline network, Westcoast Energy maintains North America's largest gas processing plant in Fort Nelson which removes sulphur and other impurities from the gas before it is piped to southern markets. Following discovery of oil in the Desan field, northeast of Fort Nelson, an all-weather road was built in 1984 to permit year-round access from Fort Nelson.

3.0 Current TSA Situation

The currently approved AAC for the Fort Nelson TSA is 750,000 m^3 of coniferous, 60,000 m^3 of balsam/poplar,[1] and 77,000 m^3 of aspen. The cottonwood licence was recently reduced from an AAC of 145,000 m^3 because of undercutting on the licence in the first five year control period. The distribution of the entire AAC is as follows:

Current AAC Allocation in the Fort Nelson TSA

	Coniferous	Deciduous
Tackama (2 licences)	673,716	
Tackama (1 licence, cottonwood)		60,000
Canadian Chopsticks (1 licence, aspen)		77,000
SBFEP Total	74,284	
Woodlot Licences	2,000	
Total	750,000	137,000

Tackama's projected 1993 timber supply is 815/820,000 m^3. This is comprised of its own licensed volumes of 733,000 m^3, plus 68,000 m^3 or 90% of licensed Small Business allotments, plus another 13/18,000 m^3 from private sales, Canadian Chopsticks residual, seismic line salvage, and miscellaneous other amounts (including some aspen).

3.1 TSA Planning Process

The scenarios examined are based on the inventory information contained in the "Fort Nelson TSA Timber Supply Analysis Report", released in June 1992 by the Prince George Forest Region. This was the first comprehensive analysis carried out for this TSA since 1984, and the first to incorporate new integrated resource management guidelines. This same information was subsequently used for a discussion paper on TSA forest management options released by the Fort Nelson Forest District in October 1992.

The scenarios analyzed are not exhaustive of those that might in future be considered. Rather, they follow from the direct projection of past performance and utilization standards by the TSA's coniferous licensee (Tackama). While alternative scenarios involving higher harvesting levels might also be considered, these are dependent on changes in harvest and wood utilization practices that were not assumed for the baseline analysis. One possible alternative scenario is later considered as a mitigation option in Section 7.0.

[1] The term cottonwood is used throughout to cover balsam poplar.

Sustainable harvesting levels for each scenario are derived based on estimates of available timber volumes, and of how much of that timber is merchantable. The merchantable proportion of standing timber is arrived at by examining factors such as distance from the mill, quality of the growing site, leading species, etc., and through consideration of the licensees actual past performance. By varying this licensee performance (e.g., to taking more pine), alternative harvesting options can be simulated. Estimates of accessible timber volumes are tied to estimates of the total land area available for harvesting access. This is calculated as follows:

Fort Nelson TSA Profile:

Total TSA Area:		8,207,660 HA.
Less:	Alienated Land[2]	147,873 HA.
	Non-Productive Land	3,775,283 HA.
Totals:	Productive Land	4,284,500 HA.

Exclusions from the Productive Crown Forest area are calculated to estimate the net land base available for timber supply. In the case of the Fort Nelson TSA, the following exclusions were applied (with size of the area varying by the particular scenarios chosen):

- NSR Land (311,565 HA.)
- Non-Commercial Brush (598,215 HA.)
- Environmentally Sensitive Areas (116,108 - 147,189 HA.)
- Low growth potential sites (379,972 - 386,757 HA.)
- Range burns, Agricultural set-asides, Klua Lakes moratorium (0 - 50,739 HA.)
- Unmerchantable Deciduous (924,278 - 1,133,794 HA.)
- Unmerchantable Coniferous (1,040,606 - 1,438,701 HA.)

These exclusions remove an additional 3,503,014 - 4,022,394 HA. from the Productive Land Base, yielding a Net Land Base ranging between 262,105 -781,486 HA., depending on the utilization and licensee performance standards assumed, and on whether aspen is or is not included. The low end of the range is based on past licensee performance, whereas the high end reflects higher utilization standards and aspen usage. Note that unmerchantable deciduous or coniferous can represent between 46% and 60% of the Productive Crown Forest area. Most of this is located in supply blocks lieing beyond an economically viable distance to existing processing facilities; however, it also includes that lost to seismic programs (5% of productive forest land).

Before arriving at the allowable harvesting and sustainable yield levels associated with these different Net Land Bases, Integrated Resource Management (IRM) guidelines have first to be imposed. For the harvest scenarios examined in the following Section 3.2, these were relatively

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[2] Alienated land refers to existing provincial park areas, Indian Reserves, and other reserves, whereas Non-Productive Land refers to that which cannot sustain timber growth (e.g. swamp, muskeg, alpine).

simple ones, i.e., TSA-wide two-pass systems; for the mitigation scenario later examined in Section 7.0, a more sophisticated IRM standard was applied, one adapted to the specific multiple use management objectives of the six Resource Unit areas the TSA has been divided into. These Resource Units are distinct land areas displaying specific biophysical features, resource-use potentials, and/or management constraints. The six Resource Units of the Fort Nelson TSA are as follows:

RU 1: Liard River-Smith River: Located in the north-west corner of the TSA, this is an area that is seen as having possible future timber potential but at this time is not economic to Fort Nelson. This area is excluded from the AAC, with the primary management emphasis that of protecting other resource values, i.e., waterway and lake recreation, heritage sites, and prime game areas.

RU 2: Liard Plateau-Toad River-Tuchodi Lakes-Prophet River: This RU covers most of the western half of the TSA extending from its northern to its southern boundary. It is an area that contains outstanding wilderness and outdoor recreation opportunities and the maintenance of these is the primary management objective. It contains two existing parks, Muncho Park and Stone Mountain Park, two proposed parks, Grayling River and Foothills, and a major Wilderness Study Area, the Muskwa study area. The rationale for the prohibition on logging within parts of this study area (which extends into RU 3), is questioned by Tackama and some community representatives.

RU 3: Liard River-Steamboat Mountain-Prophet River-Klua Lakes: This is a narrower north-south strip parallel and to the east of RU 3. Limited timber harvesting is to be allowed in this area, constrained to meet important visual, outdoor recreation, and wildlife habitat objectives. It contains the eastern portion of the Muskwa wilderness study area. Because of the multiplicity of competing resource values within this RU, this is the one about which there is most disagreement.

RU 4: Fort Nelson-Trutch-Kotcho Lake: This is the major industrial area in the District, the primary management aim of which is to maintain timber availability and existing levels of geophysical activity. IRM guidelines would be applied to protect other resource values in the area. This RU includes the Prophet River old growth area deferred from logging in 1990.

RU 5: Maxhamish Lake-Petitot River: This area covers the north-east portion of the TSA. It has less important timber values but important subsurface resource values. The primary management objective is to protect its water-fowl habitat areas as well as its potential for water-based recreation opportunities. A second wilderness study area, the Petitot River wilderness area, is proposed for much of this RU.

RU 6: Alienated Land adjacent to Fort Nelson: This is land excluded from the provincial forest, which no longer supports the AAC. It has potential for agriculture development.

These Resource Unit designations are to be the primary basis for future TSA forest management planning. While the scenarios evaluated below incorporate a less sophisticated IRM prescription than would follow from an RU basis analysis, and may have to be revised to reflect this RU basis at a later date, they are still considered to be reliable prescriptions of the harvesting patterns that should finally result under the assumption of unchanged licensee performance standards.

3.2 IRM Scenarios

Each of the following revised harvest scenarios should be evaluated in terms of the present situation, i.e., a 750,000 m^3 AAC for coniferous, and a 60,000 m^3 AAC for cottonwood.

Scenario 1: Basic Silviculture

AAC and LRSY levels for Scenario 1 are determined on the basis of two key assumptions:

- Firstly, that basic silviculture standards (defined as the on-going replanting of areas as they are logged) will be met, and in particular that mixed wood, leading spruce stands are restocked to spruce, and the amount of deciduous trees in the regenerated forest is controlled. The assumption that basic silviculture standards will be met allows the future timber inventory/growing stock to be increased, as compared to the current silviculture scenario, by 12.4 million m^3, thereby permitting harvest increases above what would otherwise be feasible.

- Secondly, that IRM harvest pattern constraints are applied, in the form of a two pass harvesting system with a 20 year harvest delay between passes. These constraints identify the maximum amount of volume available to the licensee in consideration of other area values. Allowance is also made for buffer strips, site degradation, roads and rights of way.

These assumptions yield the following Scenario 1 harvest and LRSY scenarios:

- Coniferous: An immediate drop in harvest levels to 549,000 m^3, maintained until year 20, then stepped down over years 21 to 90 to the LRSY level of 351,000 m^3.

- Cottonwood: An immediate drop in harvest levels to 38,000 m^3, maintained until year 30, then stepped down over years 31 to 100 to the LRSY level of 20,000 m^3.

Scenario 2: Incremental Silviculture

Scenario 2 differs from Scenario 1 in assuming basic and incremental silviculture standards for the coniferous harvest; the basic silviculture prescription for cottonwood and the two pass IRM guidelines are unchanged. Incremental silviculture consists of the 1800 ha annual rehabilitation of NSR sites, dating from before 1982. Incremental silviculture would permit an increase of 9

million m^3 in the timber inventory/growing stock over that of Scenario 1, thereby permitting an additional increase in harvest levels.

These assumptions yield the following Scenario 2 harvest and LRSY scenarios:

- Coniferous: An immediate drop in harvest levels to 599,000 m^3, maintained at that level until year 20, stepped down over years 21 to 140 to the 354,000 level, then increased in year 141 to the LRSY level of 437,000 m^3.

- Cottonwood: No change from Scenario 1.

The complete decade by decade harvest prescriptions that flow from these scenarios is illustrated in Exhibit 3.1.

Exhibit 3.1: Fort Nelson Harvest Forecast (cubic meters per year)

Current AAC	Coniferous (Spruce, Pine)		Cottonwood
	750,000		60,000
Future Years	Scenario 1	Scenario 2	Scenario 1 and 2
	Basic Silviculture	Basic and Incremental Silviculture	Basic Silviculture
1 to 10	548876	598876	37643
11 to 20	548876	598876	37643
21 to 30	511376	586576	37643
31 to 40	511376	586576	33743
41 to 50	477076	569376	32343
51 to 60	423676	506776	28943
61 to 70	393476	450376	25943
71 to 80	393476	450376	23243
81 to 90	365576	399576	22743
91 to 100	350676	353976	20343
101 to 110	350676	353976	19843
111 to 120	350676	353976	19843
121 to 130	350676	353976	19843
131 to 140	350676	353976	19843
141 to 150	350676	436976	19843
151 to 160	350676	436976	19843
161 to 170	350676	436976	19843
171 to 180	350676	436976	19843
181 to 190	350676	436976	19843
191 to 200	350676	436976	19843
201 to 210	350676	436976	19843
LRSY	**338576**	**436976**	**19843**

4.0 Baseline Economy

4.1 Baseline Forestry

The baseline forestry situation is defined in terms of Tackama's projected 1993 operating level of approximately 820,000 m^3, [1] the assumed sourcing of which was outlined in Section 3.0. While Tackama expects to process to full capacity levels (i.e., 900,000 m^3) in 1993, this assumes approval to harvest 85,000 m^3 more of cottonwood than is presently licensed. If this were to happen, then the following employment and other impact estimates would need to be increased accordingly. The following operational profile is however based on the known fibre throughput levels of 820,000 m^3 (and an average 8% wood loss factor).

Tackama: Baseline Employment/Wage Profile

	Employment (PY's)	Pre-Tax Labour Income[2]
Tackama Employees		
Staff/Woodlands	50	$2.4 M.
Mill (hourly)	316	$13.0 M.
(includes 12 contract)		
Contract Labour		
Silviculture[3]	58	$2.69 M.
Harvesting[4]	137	$8.06 M.
Total	561	$26.15 M.

1 Tackama's 1992 mill consumption was 786,000 m^3 (89,000 m^3 deciduous and 697,000 m^3 coniferous).

2 Benefits in the range of 16% for staff and woodlands and 60% for hourly mill employees are additional to the amounts shown.

3 This is based on Tackama's silviculture expenditures, with allowance made for replanting of Small Business allotments. Tackama's total silviculture payments, based on costs to free growing of $6.11/conifer and $2.0/deciduous, amount to $4.238 million.

4 This includes the manpower requirements of Tackama's Small Business Enterprise suppliers, and is based on an assumed volume of 820,000 m^3. Nine contract logging operations would be hired for this volume. Average logging costs (excluding admin.) are estimated at $23.06/conifer and $14.82/cottonwood.

5.0 Fort Nelson TSA Accounts

5.1 TSA Sector Based Impacts

5.1.1 Forestry Sector Impacts

Employment losses arise directly from the differences between the current licensed harvest and the reduced harvest levels of Scenario 1 (223,000 m^3 initial reduction) or Scenario 2 (173,000 m^3 initial reduction). Estimates of these losses are based on the respective employment coefficients for the four categories of workers shown in Section 4.1, the combined coefficient of which is .684 PY's/'000m^3. This assumes that employment adjustments for the Fort Nelson operations would be directly proportional to the changes in wood supply. Actual employment changes are unlikely to follow this exact pattern, with two principal variations possible, one aggravating local impacts, the other mitigating local impacts:

- One possibility is that with the loss of this level of wood supply, "threshold effects" would be felt that would involve shutting down entire shifts or portions of shifts as opposed to layoffs on a simple proportionate basis. Such threshold effects cannot be accurately estimated in advance, but if they result, would be in addition to the estimates of direct employment losses provided below.

- A second adjustment possibility involves Tackama curtailing semi-processed material shipments to affiliated operations elsewhere in B.C. Cantree Plywood in Vancouver is supplied with veneers by Tackama equivalent on a net wood volume basis to approximately 90/95,000 m^3, or 11% of Tackama's total net wood supply. By taking this step, Tackama in effect could transfer a portion of the labour adjustment to workers at these other locations.

These two alternate possibilities should be kept in mind when evaluating the regional (TSA level) impacts shown in the following Table 5.1. This table shows the estimated direct and indirect regional level impacts. The indirect impacts are estimated based on a short-term Economic Base multiplier for the Fort Nelson area of 1.39, as estimated by the B.C. Ministry of Finance and Corporate Relations.[1] This short-term multiplier does not take into account any out-migration from the community of the unemployed. Were this to occur, the longer term impact could be higher, to the degree shown in Table 5.1. This is caused by withdrawal from the community of public support expenditures (e.g., U.I.) as people leave.

[1] "British Columbia Community Economic Dependencies", prepared by the Ministry of Finance and Corporate Relations for the B.C. Round Table on the Environment and the Economy, March 1993.

Points that should be noted in evaluating Table 5.1 are as follows:

- The impacts presented for each scenario relate to 28% (223,000 m^3) and 21% (173,000 m^3) licensed harvest reductions. Tackama's non-licensee wood supplies are unaffected.

- The income impact estimates are after-tax and exclusive of benefits. This is to more accurately reflect the withdrawal of spending power that might be expected at the local level. Average tax rates of 26% for forestry workers and 19% for non-forestry workers were used. A non-forestry gross wage of $28,600 was used, as per Statistics Canada's January 1993 estimate of average B.C. earnings.

- Economic base type multipliers tend to produce somewhat higher estimates of indirect effects than those obtained through other methods, such as the income-expenditure method.[2]

Table 5.1: TSA Level: Initial Employment and Income Declines

Base Year Impacts	Employment (PY's)			Net Employment Income ($M.)		
	Direct	Indirect	Total	Direct	Indirect	Total
Scenario 1 (Basic S.)	138	80	218	$4.7 M.	$1.8 M.	$6.5 M.
With Out Migration	138	140	278	$4.7 M.	$3.2 M.	$7.9 M
Scenario 2 (Increm. S.)	106	62	168	$3.7 M.	$1.4 M.	$5.1 M.
With Out Migration	106	108	214	$3.7 M.	$2.5 M.	$6.2 M.

Table 5.1 illustrates impacts under either scenario with reference to the existing level of operations. For future years, the choice lies between Scenario 1 or Scenario 2, the respective decade by decade harvest prescriptions for which are illustrated in Exhibit 3.1. As can be seen from that exhibit, Scenario 1 entails consistently lower harvesting levels throughout the future

[2] See, e.g., "Income and Employment Multipliers for Seven British Columbia Regions", H.C. Davis, Canadian Journal of Regional Science, 9:1, 1986.

period. As a result, Scenario 1 is associated with lower employment and income levels in future years as compared to Scenario 2. The extent to which Scenario 1 falls short of Scenario 2 in this respect is shown in Table 5.2. Because of the uncertainty of more long range estimates, estimates are only presented for the first 40 years (these are year by year impacts).

Table 5.2: TSA Level: Future Year Net Losses Under Scenario 1

Years	Employment (PY's)			Net Employment Income ($M.)		
	Direct	Indirect	Total	Direct	Indirect	Total
1 to 20	31	18	49	$1.1 M.	$.4 M.	$1.5 M.
21 to 40	46	27	73	$1.6 M.	$.6 M.	$2.2 M.

We can also illustrate how jobs would be lost over time, under each scenario separately, as annual harvests are successively reduced in accordance with the schedule shown in Exhibit 3.1. This is shown in Table 5.3 below. Under Scenario 2, some of these losses are reversed in Year 141 as the incremental silviculture practices take effect in reversing some of the earlier harvest declines.

Table 5.3: TSA Level: Future Employment Shifts

Year	Scenario 1 (Basic S.)		Scenario 2 (Increm. S.)	
	Direct	Total	Direct	Total
21	23	37	7	11
41	24	38	14	21
51	35	55	41	64
61	21	33	37	58
81	19	30	33	53
91	11	17	30	47
(Losses)				
141	-	-	51	81
(Gain)				

5.1.2 Tourism and Recreation Sector Impacts

One possible source of offsetting employment and income gains is the recreation and tourism sector. What these might amount to depends on the degree to which the IRM harvesting guidelines envisaged under Scenarios 1 and 2 will enhance the amenity value of the overall TSA area, and thus induce additional recreational based activity in the area. It is difficult to be definitive about this effect as the IRM standards proposed do not lend themselves to amenity-specific assessment, but only to very general assertions vis-a-vis overall restrictions on harvesting practices (buffer strips, stream protection, etc.). Thus, while one can conclude that the area's general wilderness amenity value will be better protected under these guidelines, one cannot point to specific sites or areas of interest that would be better protected. Unlike in some other TSA assessments, there are no specific Visual Quality landscapes or new protected areas that are inherent to the IRM guidelines of Scenarios 1 and 2. The protected area additions to the Fort Nelson TSA (e.g., Klua Lakes moratorium, Wokpash Recreation area etc.) that are occurring are under separate processes and are not integral to the IRM scenarios being considered here. Many of these other proposals also lie outside the operable forest area.

What can be claimed with respect to enhanced area amenity values and offsetting tourism and recreational gains is therefore limited. The following should be viewed as "guesstimates" only of what might be feasible:

- As stated earlier, the primary objective of area tourism promoters is to increase the length of stay of touring and in-transit groups. Certainly, more controlled harvesting methods would contribute to achieving this goal. Nevertheless, the enhancement of landscapes or specific amenities under either scenario is too tenuous to support establishment of any definite link to increased touring numbers. Any increase arising from this source could also be offset by a decline in resident-related visits as forestry sector employment declines.

- One possible beneficiary of more controlled harvesting methods would be the area's guide operators and adventure travel operators. As stated earlier, there are an estimated 40 PY's presently associated with guide outfitting in the Fort Nelson TSA, though only half of those are operating within the impacted area. The link between a lower and more controlled level of harvesting and an expanded level of activity for this sector is viewed as a plausible one. Because of the movement patterns of animal species, this beneficial effect would extend to those operators beyond the working forest. To approximate the possible upside impact for this group, a 50% expansion in direct activity and direct employment is assumed (i.e., 20 additional jobs). On the basis of an average guide-outfitting sector wage of $21,000, this should support approximately 7 additional indirect jobs. These impacts would all be confined to the Fort Nelson Region.

Over some indeterminate future period therefore, we are suggesting a possible offsetting employment gain of around 27 PY's in the recreation and tourism sector.

Since identical IRM standards apply in Scenarios 1 and 2, no differential impacts under each can be inferred.

5.1.3 Energy Sector Impacts

There are no appreciable energy sector impacts, either with respect to deviations from the baseline situation, or in terms of differences between Scenarios 1 and 2. Generally speaking, the forest industry piggybacks its access on the seismic lines cut by the oil and gas exploration sector (annual land losses to seismic lines of about 3000 hectares are on a par to the annual land logged in the TSA). Thus, the causal effect is generally from the energy sector to forestry, and not the other way round. While IRM guidelines can impose restrictions on oil and gas activity, principally through requiring hand-cut seismic lines in sensitive areas, such restrictions are not particular to the two scenarios being evaluated here, and are separate from the issue of timber harvest determinations. No incremental energy sector impacts that are tied to either of these two scenarios therefore exists. Possible energy sector trade-offs may be an issue in the broader Resource Unit process, e.g., the primary use designations that may finally be settled on for the respective Resource Units. RU's 2 and 3 are of particular note in this regard, because of the relatively unexplored nature of these units, and because of the potential resource values conflicting with energy exploration.

5.2 TSA Non-Sector Impacts

5.2.1 Community Impacts

The immediate, community-level impact of either harvest scenario would be very severe, entailing job losses under the respective scenarios of up to 218 positions (under Scenario 1) or 168 positions (under Scenario 2), as detailed above under Section 5.1.1. These are substantial numbers in a community of Fort Nelson's size, representing approximately 9% and 7% respectively of the areas estimated labour force. The area's unofficial unemployment rate would jump from the existing 5% level to about 14% or 12% respectively.

Longer term, the community-level impacts would depend on what proportion of those losing their jobs would choose to leave the Fort Nelson area. There are currently no equivalent employment opportunities in the Fort Nelson area for numbers of that magnitude, and certainly none that offer the same level of income opportunity (other than in the energy sector, but it is not expanding to anything like the degree needed to absorb these numbers). The only real alternative for most of those laid off would therefore be out-migrating and leaving the community, or staying and remaining unemployed for an indefinite period. Without a survey of area workers, one cannot presume the likely outcome. There are however significant disincentives to moving, at least over the near term (twelve to eighteen months). Firstly, alternative employment opportunities, particularly in the forestry sector, are no better elsewhere in B.C. or Alberta, and most residents are well aware as to the longer term development possibilities tied to the harvesting of the aspen resource; secondly, a large number of workers have in recent years invested in permanent area homes, and would risk substantial capital losses were they to leave; and finally, Fort Nelson appears to be viewed by most of the current

residents as a highly desirable place of residence, and one that most would only very reluctantly leave.

In our view therefore (admittedly based on limited direct evidence), large-scale out-migration is not a necessary outcome. With or without out-migration, additional strain and costs for the community's social service system (health, policing, etc.) is highly probable. To cope with that level of layoffs, special adjustment assistance measures, possibly involving provincial support, could be required. The concerns that exist at the community level that the on-going viability of some of the operations that supply services to Tackama, e.g., the B.C. Rail branch line, would be jeopardized under the harvest reductions envisaged, would also need to be addressed. Area residents are greatly concerned over the possibility of additional "domino" effects, the most significant of which relate to the negative impact on potential future area investments recently under consideration, i.e., an OSB mill, a pulp mill, or a copper electrowinning plant.

Fort Nelson would be fortunate in at least one respect, i.e., the relative immunity of it's revenue base. The great bulk of Fort Nelson's $300 million taxable assessment is comprised of energy sector assessments. Of that total, the residential assessment share is only $20 million, and residential property taxes contribute only $33,000 annually to the district's $3.6 million in (non-school) property tax revenues. Clearly, Fort Nelson's revenue base is relatively immune to any residential property value declines. The same is also true of Tackama itself, whose direct property tax payment of $248,000, comes to less than 7% of the total municipal revenue base. Furthermore, ability to pay would only be affected by plant closure, but not by a reduced level of operations.

5.2.2 Environmental Impacts

These would appear to be positive under either Scenario 1 or 2, if one accepts that the Integrated Resource Management guidelines proposed are an improvement over those enforced in the past. Because of the non-site specific nature of the proposed guidelines, the impact of these IRM forest land management options on non-commercial environmental resources within the planning area can be discussed only in a very general way. Nor is there enough evidence to infer any significant difference in this respect between Scenarios 1 and 2. The guidelines are identical in each case, the only difference being a higher rate of harvest under Scenario 2, tied to incremental silviculture being undertaken. It might be plausible therefore to assume that the beneficial impacts identified below of either option over the present situation would be somewhat less with the higher harvesting targets associated with Scenario 2.

Within the Fort Nelson planning area, there are four identifiable environmental attributes that might be impacted by changes in the level of harvesting and in the way harvesting is carried out. These are as follows:

- Genetic Biodiversity;
- Wildlife Habitat;
- Riverbed Stability and Fisheries Habitat; and
- Local Recreational Use.

Genetic Biodiversity: This refers to the qualities of the tree growing sites which are deemed to be of importance both from a gene pool or educational/scientific point of view, or from a straight conservation point of view. The conservation point of view is a 'non-utilitarian' one, that emphasizes that the elements of the natural environment, such as biodiversity, have value in and of themselves, and we alter them at our risk. Another more utilitarian point of view is that maintenance of a gene pool within any ecosystem may yield a range of educational and/or knowledge benefits, such as information concerning the adaptation of certain plant species to particular sites (e.g., alluvial sites) or of the possibilities of tree type improvements. The importance of this attribute correlates with the uniqueness of the site(s) in question, and the non-existence of equivalent substitutes at other locations. No evidence was presented in the course of this enquiry to demonstrate the potential jeopardising of these area attributes under either the present situation or either of the two scenarios. For the tree species under consideration, the old growth alluvial white spruce and cottonwood do have distinct genetic traits that have to be preserved (the big river bottom stands have not been impacted by fire and are somewhat unique). The continued existence of either is not, however, an issue under any of the scenarios envisaged. There are significant equivalent stands outside of the working forest area, e.g., in the western portion of the TSA, as well as in protected areas closer to Fort Nelson itself (e.g., the Prophet River Old Growth area). The evidence therefore is that insofar as this general environmental attribute is concerned, the net impact of either Scenario 1 or Scenario 2, while presumed to be positive, is quantifiably indeterminate.

Wildlife Habitat: A considerable variety and number of wildlife are to be found within the Fort Nelson TSA area. The more significant are: Black and grizzly bear; moose, elk, and deer; various raptors such as bald and gold eagles and red tailed hawks; and pine marten, weasel, lynx and voles. Mountain sheep and goat are also present but are more to be found to the west (the Rocky Mountain foothills) of the impact area. The IRM harvesting guidelines of Scenarios 1 and 2 are designed to be sensitive to the protection of crucial wildlife habitats such as mineral licks, winter canopy cover, or riverbed protection. To be truly effective over such a wide area however, the guidelines will need to be policed and enforced. Wildlife habitat should also benefit from the reduced rate at which the wilderness areas will be opened up to the casual hunter, as lower harvesting rates are enforced. It should also be noted that in addition to the IRM standards to be applied within the working forest area, specific Environmentally Sensitive Areas (ESA's) are also being set aside under all options being considered; for Scenarios 1 and 2 these total 116,000 hectares. A moratorium on harvesting in the Klua Lakes area is also common to all scenarios being considered.

Riverbed Stability and Fisheries Habitat: While not as established or as accessible as other parts of the province, there is a substantial sport fisheries resource in the Fort Nelson TSA area. The principal species are dolly varden, northern pike, grayling, pickerel, and burbot. Riverbed harvesting can increase the damage associated with spring run-off and erosion of the river banks. Through the removal of the soil stabilizing force provided by the forest, spring run-off and erosion can increase the levels of debris and silt deposited in the water courses which in turn would adversely affect fish habitats. While most of these fish types are well adapted to muddy water situations (the natural state of the glacial rivers in this area), increased levels of debris associated with uncontrolled logging practices are clearly detrimental to the fisheries resource.

Additional damage is associated with logging adjacent to the smaller upstream spawning tributaries. The IRM guidelines impose stricter safeguards on riverbed logging (e.g., buffer blocks, river strips, etc.), the net impact of which will also unquestionably be positive.

Local Recreational Use: The TSA wilderness area is used on a regular basis by a sizable proportion of area residents. This use is concentrated in areas close to and accessible from Fort Nelson, i.e., ATV access off the Alaska Highway or by boat along the Muskwa River. There is no evidence that this existing level of use will be altered under either scenario under consideration, other than through possibly reduced access choices were harvesting levels and logging road networks to be curtailed.

5.2.3 Native Community Impacts

There are approximately 400/500 natives resident in the Fort Nelson TSA, 300/400 of whom live in Fort Nelson itself, 50/100 on the Prophet River Indian Reserve, and the balance in very small or isolated settlements scattered throughout the TSA. Based on the limited information assembled, the native community might be divided in it's views, but would on balance support the reduced harvest levels proposed. Some members of that community, both from Fort Nelson and Prophet River, are employed in silviculture and woodlands operations (with one well established native-run contracting business based in Fort Nelson) and may therefore stand to lose from any curtailment of operations. This may be a minority viewpoint however; the traditional and increasingly widely shared perspective is that past harvesting practices have not respected the values inherent in the land; this perspective is reinforced by the interests of native trappers, of whom there are a dozen or two in the wider area. Area natives belong to the Treaty 8 group (which extends into Alberta), and outstanding land claims are not an issue.

6.0 Provincial Accounts

6.1 Provincial Economic Impacts

Provincial economic impacts cover those that arise in addition to those already estimated for the Fort Nelson TSA and presented in Section 5.0 above. These additional province-wide impacts are limited to those arising out of changes in the level of forestry based activity. As discussed in Section 5.1.2 above, while there are likely to be some offsetting employment and income gains in the wilderness recreation and tourism sector over the longer term, they are relatively minor, and are adequately captured at the TSA level.

Direct provincial impacts include, in addition to TSA level direct impacts, those associated with the estimated 10% non-Fort Nelson labour component. Indirect province-wide impacts are estimated using a total (wage and non-wage) GDP multiplier of 2.0, a wage GDP share of 60%, and a provincial average wage of $28,600 (valid as of January 1993)[1]. Employment income is presented on a before tax, net of benefits basis. Total provincial impacts are shown in Table 6.1 (these are all forestry driven, any offsetting recreation based impacts would not materialize until further into the future). These provincial employment impact estimates should be compared to rows one and three of Table 5.1 (the out-migration scenarios of Table 5.1 are relevant only at the regional level). The provincial employment impact totals of 371 and 286 respectively indicate that 41% of the total job losses would occur outside of the TSA, and 59% within.

Table 6.1: Provincial Level: Employment and Income Impacts (Declines)

Base Year Impacts	Employment (PY's)			Gross Employment Income ($M)		
	Direct	Indirect	Total	Direct	Indirect	Total
Scenario 1 (Basic S.)	153	218	371	$6.8	$6.2	$10.0
Scenario 2 (Increm. S.)	118	168	286	$5.2	$4.8	$13.0

[1] Non-wage GDP refers to Tackama's reported 1992 pre-tax business income. The GDP multiplier of 2 is as recommended in MOF's Interim Evaluation Guidelines. The 60% wage GDP is share is based on British Columbia Economic Accounts data.

Tables 6.2 and 6.3 repeat at the provincial level the TSA level information displayed in Tables 5.2 and 5.3. Table 6.2 illustrates the employment and employment income differential of Scenario 2 over Scenario 1, on an annual basis, over the first four decades. As the table shows, the higher harvesting levels associated with the incremental silviculture of Scenario 2 allows 82 jobs to be saved in each of the first 20 years, and 123 jobs to be saved in each of the following 20 years. Finally, Table 6.3 illustrates the rate at which additional jobs would be shed in future decades under each scenario separately, were the AAC levels set out in Exhibit 3.1 to be adhered to.

Table 6.2: Provincial Level: Future Year Losses under Scenario 1

Years	Province Wide Level					
	Employment (PY's)			Gross Employment Income ($M)		
	Direct	Indirect	Total	Direct	Indirect	Total
1 to 20	34	48	82	$1.5	$1.4	$2.9
21 to 40	51	72	123	$2.3	$2.0	$4.3

Table 6.3: Provincial Level: Future Employment Shifts

Year	Scenario 1 (Basic S.)		Scenario 2 (Increm. S.)	
	Direct	Total	Direct	Total
21	26	63	8	19
41	27	65	15	36
51	39	94	45	109
61	23	56	41	99
81	21	51	37	90
91	12	29	33	80
(Losses)				
141	-	-	57	138
(Gain)				

6.2 Provincial Revenue Impacts

Lower harvest levels will negatively impact provincial revenues. In the area of resource taxes, the major component is the provincial stumpage on licensee harvests. The indicated average 1993 stumpage rates for the Fort Nelson District of $\$11.43/m^3$ for spruce and $\$0.50/m^3$ for cottonwood were used to calculate stumpage revenue losses. The cottonwood rate was set at that low level in the mid-1980's (prior to 1985 there was no demand for it or for other deciduous species in the region). While it is currently under review, there is no clear evidence that it will be changed or increased. Prior to this year, the spruce stumpage was also set at a low rate, i.e., $\$1.50/m^3$ (and $\$4.15/m^3$ for the much smaller volumes cut under the SBFEP). This low rate is now under review and a substantial increase is in process. While 1993 and future rates are not yet guaranteed, a rate of $11.43 was suggested by MOF region staff as in line with the evidence accruing from the appraisals carried out to date of actual cutting permits.[2]

A second major source of provincial revenue loss is that of foregone personal income taxation. Based on the province-wide employment and income declines shown above in Section 6.1, these were estimated on the basis of average tax rates of 26% in the forestry sector and 19% in non-forestry sectors, and a provincial tax share of 33%.

For the remainder (logging and corporate income tax, property, sales and electricity tax), a composite tax of $\$5.80/m^3$ was used, based on MOF information.[3]

The following tables illustrate the estimated combined provincial revenue losses from these three sources, Table 6.4 for the period immediately following the revised guidelines (for each of the two scenarios), and Table 6.5 the net revenue losses in future years of Scenario 1 as compared to Scenario 2.

Table 6.4: Initial Year: Provincial Revenue Losses

	Stumpage	Personal Income Taxes	Other Taxes	Total
Scenario 1 (Basic S.)	$2.14 M.	$0.97 M.	$1.29 M.	$4.4 M.
Scenario 2 (Increm. S.)	$1.56 M.	$0.75 M.	$1.0 M.	$3.31 M.

[2] The indicated TSA rate is more valid as a measure of the short-term impact on provincial revenues. Longer term use of the indicated rate may overstate the revenue loss impact, as the Region's overall target rate could be adjusted to compensate for the loss of the Fort Nelson timber volumes.

[3] From Table 11, "Economic Impact of Timber Harvesting in British Columbia" based on Price Waterhouse Annual Survey of the Forest Industry, adjusted to 1993 values.

Table 6.5: Future Year Revenue Losses under Scenario 1

	Stumpage	Personal Income Taxes	Other Taxes	Total
Years 1 to 20	$572,000	$217,000	$290,000	$1.1 M.
Years 21 to 40	$857,000	$323,000	$435,000	$1.6 M.

6.3 Provincial Environmental Impacts

Provincial environmental impacts over and above those identified at the TSA level were not identified. As indicated earlier, while there are provincially significant scenic and other attributes within the Fort Nelson TSA, the outlook for none of these is materially altered under the various IRM options being considered. The environmental impacts identified in 5.2.2 above for the TSA level may therefore also be taken as valid at the provincial level.

7.0 Mitigation Options

As discussed in Section 5.0, the projected harvesting reductions under Scenario 1 or Scenario 2 would have quite severe economic activity and employment impacts at the regional level. Both of these scenarios were developed on the basis of unchanged licensee performance standards. Were these performance standards to be modified, higher harvest levels could be supported, and the negative economic impacts associated with either scenario mitigated or eliminated altogether. One alternative scenario based on modified performance standards is that presented by MOF as Scenario III Alternative Plan A in their June 1992 TSA Report, or as Option 2 in their October 1992 Fort Nelson District Scenarios Report. Both represent essentially the same option, the outlines of which are the following:

- Coniferous LRSY of 821,000 m^3.
- Cottonwood AAC of 118,000 m^3, declining after 80 years to a LRSY of 54,000 m^3.
- Aspen AAC of 230,000 m^3, declining after 70 years to a LRSY of 110,000 m^3.

While this alternative scenario may be used as a reference for examining possible mitigation options, the related harvest forecasts are in no way final, and would be revisited before any final decisions are made. What is important is that they indicate the existence of upside harvest potential under more complete utilization standards, i.e. the harvesting of aspen, leading pine, and lower volume mixed wood stands. As compared to Scenarios 1 and 2 examined earlier, the net land base is approximately three times larger (781,000 hectares versus 262,000 hectares). This increase is for a number of reasons; the partial inclusion of aspen stands (clear no stain aspen sought for chopstick manufacture only); 207,000 hectares of leading pine stands completely excluded before; and inclusion of a substantial volume of mixed wood and lower volume spruce forest types excluded before. Land excluded due to remoteness from Fort Nelson, seismic losses, agricultural leases, etc., are the same as under the earlier Scenarios 1 and 2. Harvesting levels are also calculated with reference to the management intent of the Resource Units identified earlier, and incorporate the integrated resource management guidelines that are part of those Resource Units.

7.1 General Impact Assessment

7.1.1 Forestry Impacts

There are two primary forestry related impacts associated with the above scenario. These are the following:

- Firstly, the maintenance of wood fibre supplies to Tackama's operations at existing levels, the direct consequence of which would be to maintain employment and income impacts at approximately current levels, as outlined in Section 4.0 above. Because of the modified forest profile and utilization standards, the input fibre mix would have a significantly higher proportion of pine, aspen, and smaller diameter spruce.

According to company sources, the only existing constraints to the increased use of these wood types are market related ones, and both the company's harvesting plans and it's mill technology have been designed with the longer term intention of using these wood types (with the existing example of a $400,000 road expenditure this logging season to access blocks of leading pine stands). The pine is used in the stud mill as well as for plywood filler, while the aspen is largely plywood filler; while the company is experimenting with surface veneers for each (and for cottonwood), there is as yet no official certification or market approval. Experimentation with aspen chips is also occurring.

- The second primary impact would be derived from the increased aspen harvest. The full potential of this harvest is not reflected in the above aspen AAC or LRSY levels, which are calculated based only on the restricted aspen profile suitable for chopstick manufacture. There is an additional TSA aspen supply many times this level. This aspen has two potential uses in the Fort Nelson area, as a basis for a new OSB or a new pulp mill. Possible profiles of each are as follows:

New OSB Mill: This is presently viewed as the most likely development option, based on a relatively more favourable market situation (low levels of market penetration in the US West). It is however the second choice of the local economic development committee, who favour a pulp mill start up. An OSB mill operation is being actively investigated by at least two potential investors, Tackama being one. One possible scale of plant is Louisiana Pacific's Dawson Creek operation, the specifications of which may be used as a reference for a Fort Nelson operation:

- annual aspen fibre consumption of 600,000 m^3;
- annual output capacity of 400,000 m^3 of 3/8 inch OSB;
- $50 million capital investment;
- annual full-time employment levels of 170 in mill operations (including staff), and 200 in woodlands/harvesting;
- approximately $28 M. annually in wage and benefits payments to mill employees and in contract payments to loggers.

A major benefit of this operation is that a significant portion of the aspen processed would be residue from the existing chopsticks operation. This residue is substantial, approximately 320,000 m^3 annually, most of which (according to MOF sources) would be suitable for an OSB operation. In addition to the environmental benefits of reduced waste, this would also improve the operating economics of the chopsticks operation, which would be stabilized through a substantial reduction in their overall wood delivery costs. The finished OSB product would most likely be shipped out using the existing B.C. Rail line.

New Pulp Mill: This option was extensively investigated (by Tackama) 3/4 years ago, but plans have been put on hold at least in part due to the depressed state of pulp markets. Based on an investigation carried out for the village of Fort Nelson in 1987,[1] a Bleached CTMP mill would be the most viable candidate for the area, as BCTMP is a high yield pulp (as compared to Kraft pulp), and aspen represents the most desirable hardwood fibre for its production. While certain BCTMP grades can be produced from a higher percentage of hardwoods, a high softwood mix is still required, which would be a constraint given the other area demands on that resource (unless the spruce chips presently shipped out of the area were to be re-routed) . The Reid Collins study estimated an economy of scale sized plant of 195,000 MTPY with a capital cost close to $200 million ($1987), and a mill staffing requirement of 90.

7.1.2 Community Impacts

Under any of the above development scenarios, it is clear that community level socio-economic impacts would be significantly improved, with the stabilizing of Tackama's veneer/stud mill labour force at existing levels, and an expanded directly employed labour force of 370 with an OSB mill (or 90 minimum with a pulp mill). These would be on-going permanent employment positions, with which would also be associated additional locally based indirect employment (estimated at 90/100 positions with an OSB operation). The construction related expenditure and employment activity associated with either an OSB or a pulp mill would also have a significant impact on the local economy. Relative to its existing population base, Fort Nelson could expect to experience significant short term in-migration pressures. While there might be some social disruption and costs associated with this in-migration, this would be a much more welcome outcome at the community level than the social disruption that would ensue with the loss of existing jobs under the previously examined scenarios.

7.1.3 Environmental Impacts

The major potential negative impact associated with this scenario is that of the environmental damage that a significantly increased aspen harvest might entail. Based on the assumed aspen residue takeup, a new OSB mill would entail a net increase in the annual aspen harvest of approximately 280/300,000 m^3. This is close to a doubling of existing aspen harvest levels, which even in the context of more stringent integrated resource management guidelines, may have serious environmental effects. Any detailed examination of what these might be was beyond the scope of this report, but should be carefully investigated before any decisions to proceed are taken.

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[1] *Potential for an Aspen Processing Industry in Fort Nelson*, Reid, Collins and Associates, September, 1987.

8.0 Conclusions

In conclusion, the following are the principal findings around which any new harvesting decisions should revolve:

- First and foremost, particularly at the regional level, the job losses associated with either of the two reduced harvesting scenarios. These add up to an immediate Fort Nelson area job loss of either 218 or 168 positions, almost two thirds of which would be direct, forestry sector positions. There is no readily apparent area replacement for these lost positions. Some offsets may eventually arise in the wilderness recreation sector, but these would be relatively few in number (totalling 27 positions), relatively low-wage, and not guaranteed.

- The possibility of additional job losses within the community as support payments are exhausted, and laid-off workers migrate elsewhere. The cumulative community impact of added strain on social services and possible loss of business confidence.

- Additional job losses at the provincial level, estimated at 153 and 118 positions respectively, for total job losses of 371 and 286 respectively.

- Additional job losses in future years (beginning in year 21), as the respective harvesting levels under either scenario are steadily reduced to LRSY levels. This rate of future job loss is more severe under the basic silviculture assumptions of Scenario 1.

- The one bright spot at the community level is the relatively modest fiscal impact, due to the significant energy-sector based share of total assessments.

- Each scenario is associated with a generally better sustained environmental base, due to lower harvest levels of 28% or 21% respectively, and to more improved integrated resource management standards.

- Provincial revenue losses for the year immediately following implementation of either reduced harvest scenario are respectively estimated at $4.4 or $3.3 million.

- All of the aforementioned negative impacts would be eliminated under an increased harvest scenario based on the licensee changing its harvest profile, i.e., taking more pine and lower volume mixed-wood stands. The licensee's position is that its most recent performance supports such a scenario.

- Another consideration for mitigating the negative impacts of reduced coniferous harvest is that of an increased aspen harvest to support a possible area OSB mill. Allowing for the current aspen residue from the chopsticks operation, the required net increase in the annual aspen harvest would be in the range of 280,000 m^3.